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Research Article

Where there's smoke there is fire: Türkiye and the international illegal wildlife trade

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Abstract

Humans have been exploiting natural ecosystems and their resources, driving many species to extinction at the expense of global human health, the welfare of wild animals, and the integrity of Earth's ecosystems. Research has shown that the illegal international wildlife trade is of particular interest because it poses a serious threat to global health, biodiversity, conservation efforts, animal welfare, international relations, and biosecurity due to its clandestine and unregulated nature. Trafficked wild animals and wildlife products are moving between source and demand regions in the Americas, Africa, Asia and Europe. Despite a common misconception that consumers are primarily located in Asian countries, the EU is a major destination for legal and illegal wildlife trade, and certain EU countries function as transit points for illegal wildlife trafficking. Like Europe, the Middle East, including Türkiye, serves as a key transit hub for wildlife trafficking from Africa to Asia, yet no peer-reviewed studies assess Türkiye's role in these networks. Motivated by the seizure of a baby gorilla at Istanbul Airport on December 22, 2024, this study aims to identify and analyze international illegal wildlife trade involving Türkiye. This study collated publicly available data sources, revealing 55 international wildlife trafficking seizure records involving Türkiye between 2011 and 2022. The seizure records were composed of mammals (64%, 35 records), reptiles (20%, 11 records), birds (7%, 4 records) and other species (9%, 5 records). A total of 34 countries were identified as countries of origin, transit, or destination in wildlife trafficking routes involving seizures where Türkiye served as either an origin, transit, or destination country between 2011 and 2022. The data indicate that international wildlife traffickers use Türkiye predominantly as a transit hub connecting Africa with both Asia and Europe, particularly for the trafficking of ivory, rhino horn and pangolin scales between 2011 and 2022. Total quantities of items trafficked during this period were 3,156 kg and 226 pieces of elephant ivory, 176 kg and 34 rhino horns, and 6,566 kg of pangolin scales. The variety of trafficked items, including live animals such as tortoises and African grey parrots through to rare instances like an infant gorilla, underscores the complexity of the illegal wildlife trade. National authorities' commitment to law enforcement is evident from the seizures identified. The study offers practical recommendations to disrupt trafficking networks, improve data collection, and curb demand in consumer markets. By guiding policymakers, conservationists, and authorities, the study fosters international cooperation, optimal resource use, and endangered species protection. International wildlife trafficking can occur when detection and law enforcement measures fail in both the countries of origin and destination, and, where relevant, in transit countries, showing the necessity for governments worldwide to make the international illegal wildlife trade a priority.

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Key words: Gorilla, illegal wildlife trade, ivory, pangolin, pet trade, rhino, Türkiye, wildlife trafficking

Introduction

We are currently witnessing the most rapid rate of species extinction ever documented in human history, primarily driven by the exploitation of natural resources for short-term economic gains (Dirzo et al. 2014; Ceballos et al. 2017; IPBES 2019; Auliya et al. 2023). This exploitation comes at the expense of long-term sustainability, global human health, animal welfare, the survival of species and their populations, and the integrity of natural ecosystems. (Baker et al. 2013; Dirzo et al. 2014; Martin et al. 2018; Can et al. 2019; IPBES 2019; Auliya et al. 2023; Lambert et al. 2025). Wildlife is considered the source of at least 70% of all emerging diseases, and zoonotic diseases significantly impact human health on a massive scale, leading to approximately a billion cases of illness and millions of deaths annually (Kuiken et al. 2005; Karesh et al. 2007; Wang and Crameri 2014; Can et al. 2019). Therefore, the international wildlife trade, both legal and illegal, has become an increasingly significant concern in recent decades due to the spread of infectious agents including bacteria, parasites, fungi, viruses, and prions (Can et al. 2019). These agents are transmitted when wild animals are captured from their natural habitats, transported dead or alive, or their body parts traded across the world by land, sea, and air (Karesh et al. 2007; Can et al. 2019). Zoonotic diseases not only harm global human health and economies but also domestic animal health, animal welfare, international relations, and conservation efforts aimed at protecting biodiversity (Macdonald and Laurenson 2006; Parliamentary Office of Science and Technology 2008; Greatorex et al. 2016; Lambert et al. 2025). The illegal international wildlife trade is of particular interest because it poses a serious threat to global health due to its clandestine and uncontrolled nature (Can et al. 2019).

Europe and the Middle East serve as transit regions for wildlife trafficking originating from Africa (ROUTES Partnership 2020). Wildlife traffickers seem to favor certain transit countries with the Middle East identified as the world's most notable region for wildlife trafficking by air (ROUTES Partnership 2020). Most flights from Africa to the Middle East continue to Asian destinations, facilitating wildlife trafficking of ivory, rhino horn, and pangolin scales from Africa. Assessments show that although not as well-known as either the United Arab Emirates (UAE) or Qatar, Türkiye plays an important role as a key transit hotspot for trafficking attempts from Africa or Europe to Asia by air (ROUTES Partnership 2020; THEMIS 2025). However, consumers are not only based in Asian countries; there is also a significant demand from European consumers for live wild animals for the pet trade, including reptiles and birds. (ROUTES Partnership 2020). Organized wildlife trafficking networks operate out of European cities on their way to China, Vietnam, Lao PDR, or Türkiye (ROUTES Partnership 2020). Some European countries, such as France and the Netherlands, also serve as transit points for trafficking wild animals and wildlife products moving between source and demand regions in the Americas, Africa, and Asia. (ROUTES Partnership 2020).

Türkiye has been a member of the Convention on the International Trade in Endangered Species of Wild Flora and Fauna (CITES) Convention since 1996, and the by-law for its national implementation was published in 2001 (T. R. Official Gazette 2001). Türkiye demonstrated a strong commitment to the enforcement of international wildlife trade regulations by having the highest number of CITES employees among 15 European countries in both 2001 and 2005, despite the lack of available data on illegal trade seizures during that period (Kecse-Nagy et al. 2006). Between 2016 and 2018, among Egypt, Israel, the UAE, Lebanon, Qatar, and Türkiye, Türkiye recorded the highest number of seizures, indicating effective controls and law enforcement (ROUTES Partnership 2020). However, Türkiye was identified as a major source country for seizures of CITES-listed wildlife in the EU, alongside the United States, Thailand, Vietnam, and Indonesia (European Union 2024). Although the MENA FCCG UFW (2023) report suggests otherwise, the sale of wild animals in Türkiye's markets is not legally permitted. If illegal cases occur, they are quickly reported and shared on social media, generally causing public outrage. This alerts both national and local authorities, who then pursue and prosecute those involved to the full extent of the law.

In fact, the motivation for this study stems from the seizure of a baby gorilla at Istanbul Airport, Türkiye, on December 22, 2024 (Çalkaya and Tutak 2024). The video of the rescued baby gorilla has sparked widespread empathy across social media, leading to a massive show of community compassion (Anadolu Agency 2025). This has prompted the Ministry of Agriculture and Forestry to conduct a social media survey to name the animal (Çebi 2025), subsequently named "Zeytin", which means "olive" in English (Anadolu Agency 2025). This study aims to take stock of international illegal wildlife trade involving Türkiye, hoping to provide insights that will support national authorities in their ongoing efforts to tackle this issue.

Materials and methods

Finding data about international illegal wildlife trade is challenging. I employed a three-step process to gather international wildlife trafficking seizure record data involving Türkiye: first, using AI platforms to identify organizations that might hold relevant open access data; second, employing Google Advanced Search for grey literature (such as reports and other types of documents); and third, searching for peer-reviewed articles on the Web of Science platform (Fig. 1).

To identify international organizations that may potentially include data involving Türkiye, I used four AI platforms: ChatGPT (https://chatgpt.com), Perplexity AI (https://www.perplexity.ai), DeepAI (https://deepai.org), and Grok 2 (https://grok.com) to demonstrate thoroughness compared to studies relying on a single platform. I used the same prompt on each of the AI platforms and inquired about organizations that may potentially hold data related with international illegal wildlife trade. Then, I compiled a list of 21 organizations identified by the AI platforms (Table 1) and manually checked each organization's website, conducting searches within each to find data related to Türkiye. I also used the AI platform Grok 2 to double-check the grammar and the clarity of selected sentences of this manuscript.

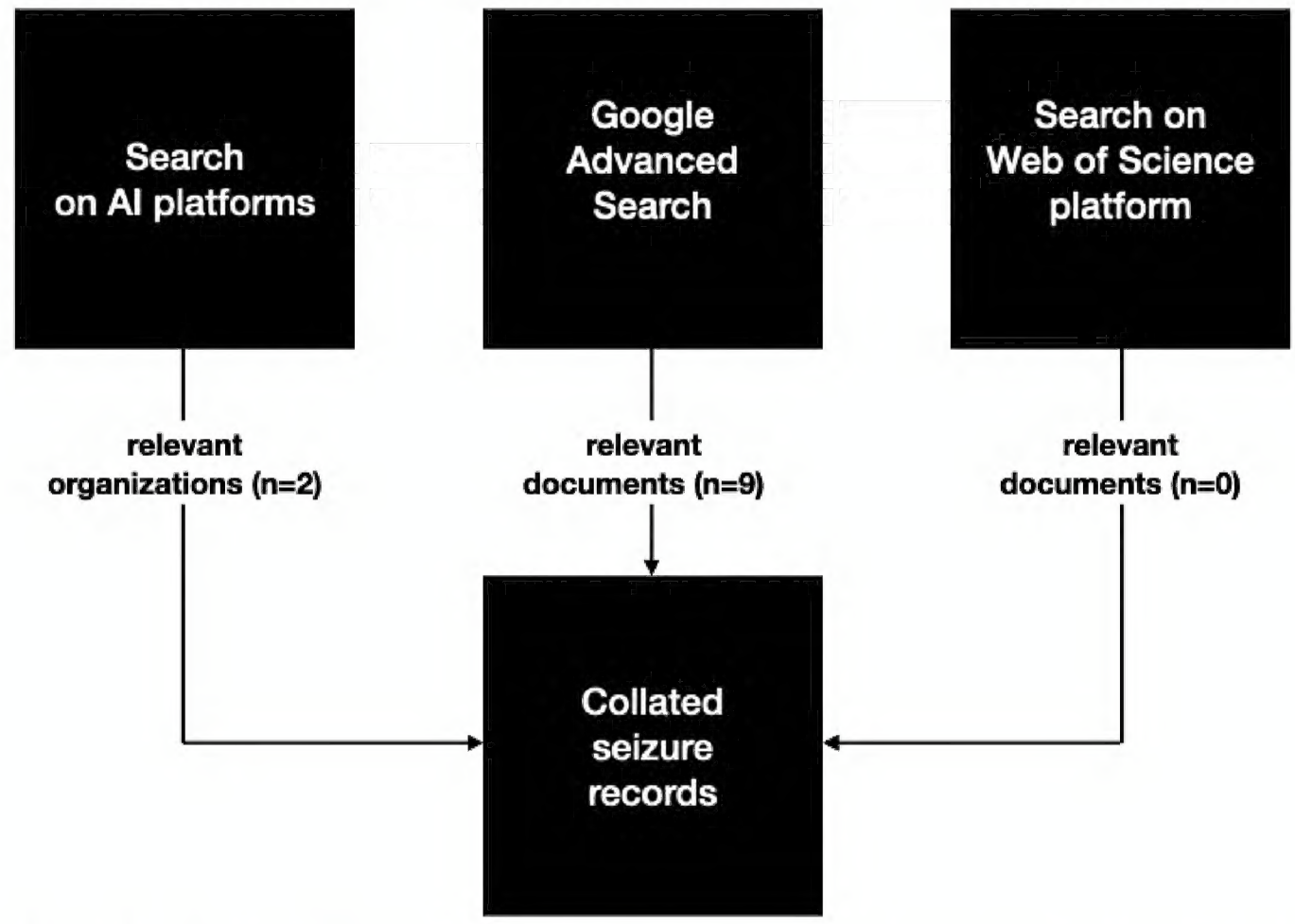

Figure 1. The approach used to search for international wildlife trafficking seizure record data involving Türkiye.

Table 1. List of organizations considered for data retrieval on international illegal wildlife trade pertaining to Türkiye.

	Organization	Name	Website	Source[2]
1	CITES	Convention on International Trade in Endangered Species[1]	cites.org	C, P, D, G
2	TRAFFIC	Wildlife Trade Monitoring Network	traffic.org	C, P, D, G
3	UNEP-WCMC	UN Environment Programme - World Conservation Monitoring Centre	unep-wcmc.org	C
4	WCO	World Customs Organization	wcoomd.org	C, P, G
5	IUCN	International Union for Conservation of Nature	iucn.org	C, D
6	USFWS	U.S. Fish and Wildlife Service	fws.gov	C
7	WJC	Wildlife Justice Commission	wildlifejustice.org	C
8	EIA	Environmental Investigation Agency	eia-international.org	C, D, G
9	INTERPOL	International Criminal Police Organization	interpol.int	C, P, G
10	UNODC	United Nations Office on Drugs & Crime	unodc.org	C, P, D, G
11	WWF	World Wildlife Fund	worldwildlife.org	C, P, D, G
12	WCS	Wildlife Conservation Society	wcs.org	C, D
13	EUROPOL	European Union Agency for Law Enforcement Cooperation	europol.europa.eu	C
14	FAO	Food & Agriculture Organization of the United Nations	fao.org	C, D
15	ICCWC	International Consortium on Combating Wildlife Crime	iccwc-wildlifecrime.org	P, G
16	IATA	International Air Transport Association	iata.org	P
17	WTA	Wildlife Trafficking Alliance	aza.org/wildlife-trafficking-alliance	P
18	C4ADS	Center for Advanced Defense Studies	c4ads.org	D
19	ENA OECDCT	Organization for Economic Co-operation & Development	oecd.org	D
20	United for Wildlife	United for Wildlife	unitedforwildlife.org	G
21	GEF	Global Environment Facility	thegef.org	G
22	ROUTES Partnership	Reducing Opportunities for Unlawful Transport of Endangered Species	routespartnership.org	ÖEC

Notes:
1. Full name is Convention on International Trade in Endangered Species of Wild Fauna & Flora.
2. The letters represent the source of each output. C: ChatGPT, P: Perplexity AI, D: DeepAI, G: Grok, and ÖEC: the author.

To identify relevant grey literature that may include international wildlife trafficking seizure record data, I used Google Advanced Search and searched for documents that mention the words "international illegal wildlife trade" and "Turkey" or "Türkiye". I checked the first 50 links Google Advanced Search provided. Finally, I conducted queries in the Web of Science platform to identify peer-reviewed articles focused solely on Türkiye's role in international illegal wildlife trade, published from 1945 to the present, using the keywords "international illegal wildlife trade", "illegal wildlife trade", "wildlife trade", combined with the Boolean operator "AND" with "Turkey", and "Türkiye". Figs 3, 4, depicting the total international wildlife trafficking seizures by year and by month involving Türkiye as origin, transit, or destination country from 2011 to 2022, were created using Datawrapper (Datawrapper 2025). Fig. 5, illustrating countries involved in international wildlife trafficking seizures with Türkiye as a country of origin, transit, or destination from 2011 to 2022, was also created using Datawrapper (Datawrapper 2025). Fig. 6 was generated using RAWGraphs (Mauri et al. 2017) to visualize the flow of trafficked wildlife across countries involved as origin, transit, or destination in cases where seizures occurred, with Türkiye as an origin, transit, or destination country from 2011–2022.

Results

The outputs from the queries made on four AI platform provided slightly different results. ChatGPT provided 14 organizations whereas DeepAI and Grok returned 10 organizations each. Perplexity returned nine organizations (Table 1). One of the organizations found was the Trade Records Analysis of Flora and Fauna in Commerce (TRAFFIC), a charity registered in the UK as a part of the Cambridge Conservation Initiative. TRAFFIC's founding members include the International Union for Conservation of Nature (IUCN), the World Wide Fund for Nature (WWF), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) and The Convention on Biological Diversity (CBD). TRAFFIC's website included a TradeMapper component to visualize and explore TRAFFIC data, which was not functioning as of January 29, 2025, possibly due to a local technical glitch or an issue with the interface. TRAFFIC's website also includes the TWIX platform, however, this is only accessible to customs and CITES management authorities, wildlife and forestry services, police, prosecutors, criminal justice departments and international organizations (such as EUROPOL, INTERPOL and the World Customs Organization (WCO)). Similarly, CITES Illegal Trade Database and WCO databases aren't publicly accessible and require special access.

Among the 21 organizations that AI platforms listed, only two organizations provided open access data for international illegal wildlife trade, namely the Environmental Investigation Agency (EIA) and the Center for Advanced Defense Studies (C4ADS). The EIA is a non-governmental organization in the UK, dedicated to combating environmental crime and has a public-domain online platform "Global Environmental Crime Tracker", which includes data on seizures, arrests and persecutions records on the illegal wildlife trade. The EIA's Global Environment Tracker database recorded six international wildlife trafficking seizure records for Türkiye from 2014 to 2019.

C4ADS is a non-profit organization with a mission to defeat the illicit networks that threaten global peace and security. C4ADS has a "Wildlife Seizure Dashboard", which showcases trends in wildlife seizures worldwide starting

from 2013 for the following wildlife trafficking categories: elephant ivory, leopard, lion, pangolin, rhino horn and tiger. However, C4ADS data for 2018–2020 provided only aggregate seizure totals for Türkiye (10 kg of ivory, 2,417 kg of pangolin scales, and 117 kg of rhino horn), limiting analysis of specific seizure trends; thus, these data were excluded.

The Reducing Opportunities for Unlawful Transport of Endangered Species (ROUTES) Partnership wasn't listed by any of the AI platforms but was found by a snowball approach when checking other organizations' websites. The ROUTES Partnership is a joint effort by transport and logistics companies, government agencies, law enforcement, conservation organizations, researchers and donors working together to disrupt wildlife trafficking worldwide and was in operation between 2009 and 2021. The interactive ROUTES Dashboard, provided 42 international wildlife seizure records (six of which were also recorded in EIA's Global Environmental Crime Tracker) concerning Türkiye for the period 2011–2020.

The nine documents, generated through the Google Advanced Search, included 13 international wildlife seizure records for Turkey (Suppl. material 1). However, the search on Web of Science platform didn't provide any specific article on illegal international wildlife trade concerning Türkiye.

Collating the seizure records from ROUTES Dashboard, EIA's Global Environmental Crime Tracker, and the documents found by Google Advanced Search resulted in a total of 55 international wildlife seizure records pertaining to Türkiye between 2011 and 2022 (Suppl. material 1). The record of an infant gorilla, seized at Istanbul Airport on December 22, 2024, was an exception and is included in Fig. 2. This type of seizure is notably rare and therefore worth mentioning, given that, according to a United Nations Environment Programme (UNEP) report, only an estimated 14 infant gorillas enter the live trade annually (Clough and May 2018).

Trafficked wildlife species

The largest number of records (61.8%, n = 34) were for wild animal parts, 36.4% (n = 20) for live animals, and 1.8% (n = 1) for medicinal products. From the data collated, it was impossible to list all the species trafficked or their exact quantities in terms of weight. In most cases, the confiscated species or items were reported under broader categories like mammals, reptiles, or birds. For such records, the quantity of items confiscated was also not reported. The seizure records were predominately composed of mammals (63.6%, n = 35) and reptiles (20%, n = 11). The remaining four records involved bird species (7.3%), two for leeches (3.6%), and one for fish, corals, and arachnids respectively (1.8% each). Some of the notifiable seizure records included 14 (25.5%) records for ivory (two of which were African elephant ivory), 10 (18.2%) records for pangolin scales, eight (14.6%) records for rhino horn, and seven (12.7%) records for reptiles. The species mentioned in the seizure records, with both common names and scientific names provided, included Spur-thighed tortoise (*Testudo graeca*), African Grey Parrot (*Psittacus erithacus*), African elephant (*Loxodonta Africana*), European eel (*Anguilla anguilla*), coral (*Scleractinia spp.*), Northern medicinal leeches (*Hirudo medicinalis*), king cobra (*Ophiophagus Hannah*), bobcat (*Lynx rufus*), red-eared slider tortoise (*Trachemys scripta elegans*), and emperor scorpions (*Pandinus imperator*). Cases involving ivory, pangolin scales and rhino horn, species names were not reported but quantities were always provided. As much as the

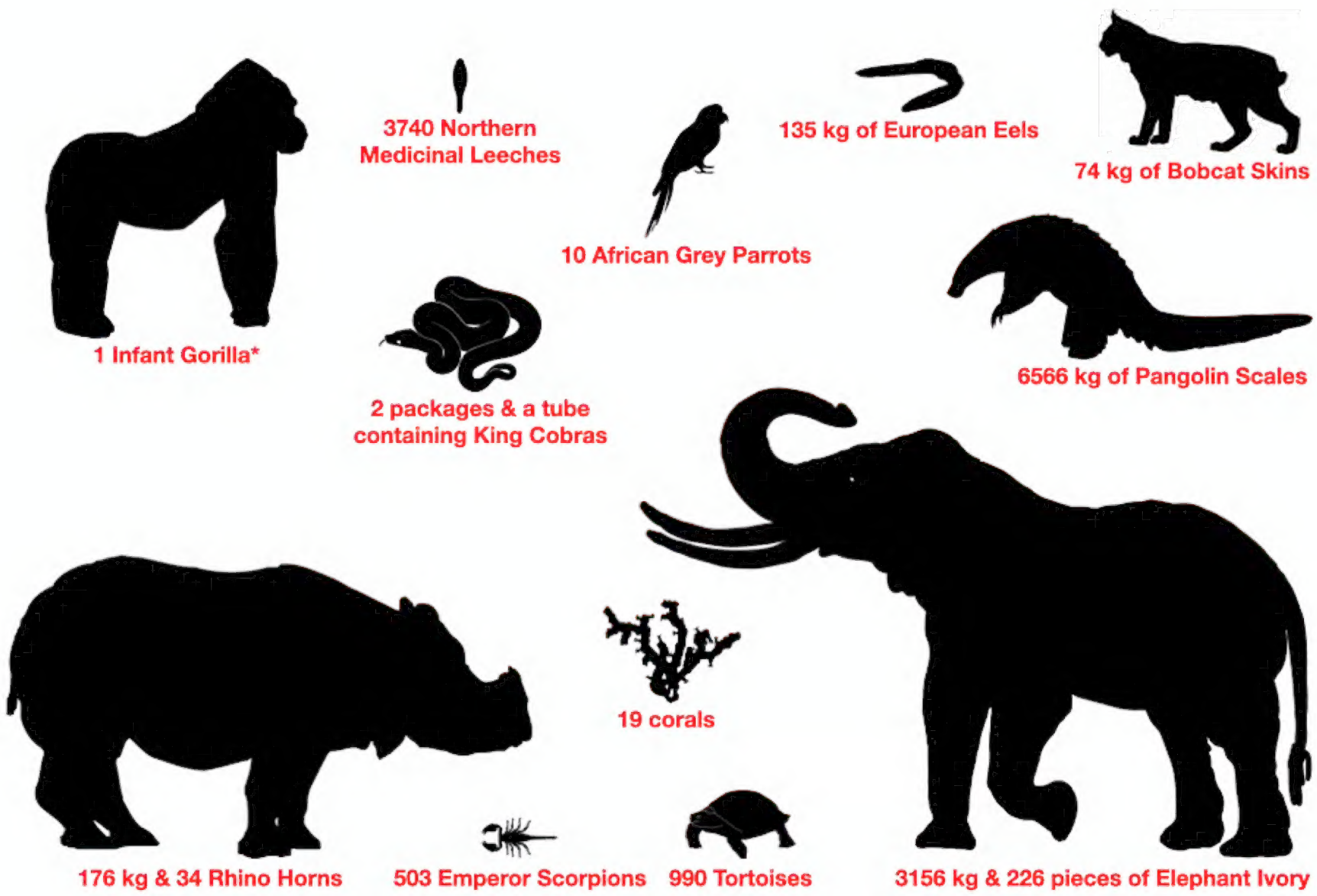

Figure 2. Identified animals that were seized in which Türkiye was the originating, transit or destination country between 2011 and 2022. Not all seizures were made in Türkiye. The data used to create the figure are presented in the Suppl. material 1. Animal silhouettes from phylopic.org are not to scale, do not represent actual species, are used symbolically, and are in the public domain by artists Becky Barnes, Christophe Mallet, Chuanixn Yu, Margot Michaud, Myriam Ramirez, Shyamal, Steven Traver, and T. Michael Keesey. *Gorilla infant seized at Istanbul Airport on 22.12.2024.

collated data allowed estimated total quantities of the animals seized between 2011 and 2022 were calculated as follows: 3,156 kg and 226 pieces of elephant ivory; 176 kg and 34 rhino horns; 6,566 kg of pangolin scales; 74 kg of bobcat skin pieces; 990 tortoises; 503 emperor scorpions; 19 corals; 10 African grey parrots; 3,740 individuals and 0.3 kg of Northern medicinal leeches; 90–135 kg of European eels; two packages and a tube containing king cobras (Fig. 2).

Wildlife seizure trends over time

Annual seizure record counts from 2011 to 2022 showed high variability (σ = 3.65, n = 55) (Fig. 3). On average, there were about 4 records per month. Monthly seizure record counts (n = 53, 2 records missing) showed moderate variability (σ = 2.07) (Fig. 4). The highest number of seizure records occurred in August (n = 9), and the lowest in October (n = 1), suggesting possible seasonal variation or a specific event.

Most of the records (78%, n = 43) lacked sufficient details to investigate the methods of seizure detection. For those records that had sufficient details, 9% (n = 5) of them were found based on risk assessments, 7% (n = 4) during routine checks, 4% (n = 2) during random checks, and 2% (n = 1) were reported to be found by x-ray scanning and sniffer dog. Similarly, nearly half (40%, n = 22) of the records did not specify how the trafficked items were transported. For the

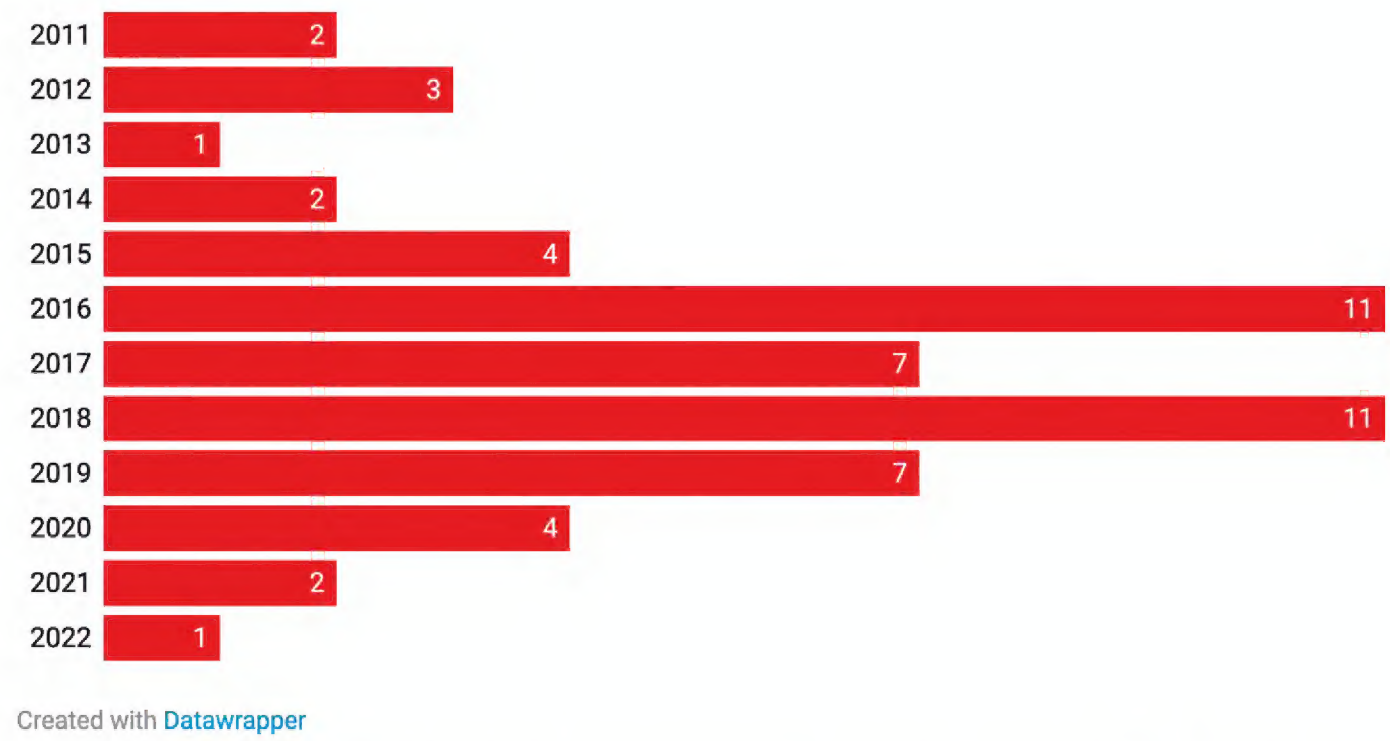

Figure 3. Total international wildlife trafficking seizures by year involving Türkiye as origin, transit, or destination country, 2011–2022. Not all seizures were made in Türkiye. The data used to create the figure are presented in the Suppl. material 1.

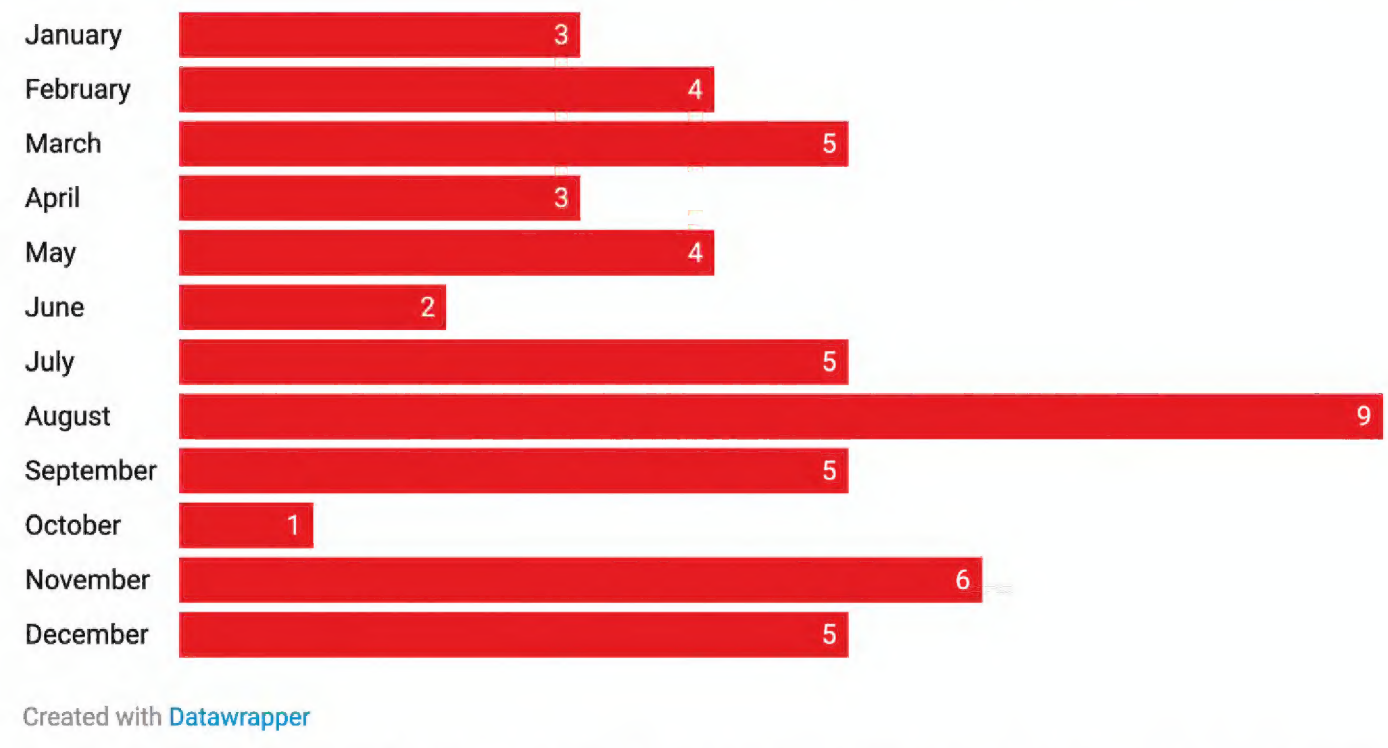

Figure 4. Total international wildlife trafficking seizures by month involving Türkiye as origin, transit, or destination country, 2011–2022. Not all seizures were made in Türkiye. The data used to create the figure are presented in the Suppl. material 1.

remaining records, 29% (n = 16) were found in checked luggage, 24% (n = 13) in air cargo (air freight), and 7% (n = 4) were carried on the person.

Of the 55 illegal wildlife seizure records, 90.9% (n = 50) involved air travel and 9.1% (n = 5) involved land travel.

Türkiye and wildlife trafficking dynamics

A total of 34 countries were identified as countries of origin, transit, or destination in wildlife trafficking routes involving seizures where Türkiye served as an origin, transit, or destination country between 2011 and 2022 (Fig. 5). In other words, if the seizures had not occurred at the origin, during transit, or at the destination in any of those countries, the trafficked wildlife would either reach Türkiye (as some did) or pass through Türkiye to continue their journey elsewhere (as others did). Türkiye had the highest number of seizures (n = 15), followed

Figure 5. Countries (marked by red dots) involved in international wildlife trafficking seizures with Türkiye (marked by an asterisk) as a country of origin, transit, or destination, 2011–2022. Not all seizures were made in Türkiye. The data used to create the figure are presented in the Suppl. material 1.

by Vietnam (n = 7), and China (n = 5). The remaining countries with seizure records are: United Kingdom (4), Germany (3), Malaysia (3), Bulgaria (2), Czech Republic (2), Netherlands (2), Thailand (2), and Austria, Greece, Hungary, Indonesia, Madagascar, Nepal, North Macedonia, Portugal, South Africa, and Uganda (1 each). Although seizures were recorded in those 20 countries, the broader wildlife trafficking network involving Türkiye, encompassing all countries in the seizure records' flight routes, included 34 countries. (Suppl. material 1).

Out of the 55 seizure records, the country of origin was not reported for three records, and multiple countries were reported as the country of origin for one record. To avoid errors and ambiguity in the analysis, these four seizure records were excluded from this part of the analysis, as incomplete or unclear country data could lead to inaccurate conclusions or misinterpretation of trends. For the remaining records, Türkiye was predominantly recorded as a transit point in 61% of cases (n = 31), the final destination in 14% of cases (n = 7), and the country of origin in 26% of cases (n = 13). (Fig. 6). For ivory shipments, Türkiye served as a transit country with the final destinations including Vietnam, Malaysia, China, and Singapore (n = 8 records) and also as the country of origin with China and Vietnam as the final destinations, where the ivories were seized upon arrival (n = 3 records). In one record, the Netherlands, where the seizure occurred, was also the country of origin, and Türkiye was the destination country. The German authorities made two African elephant ivory seizures, one involving the D. R. Congo-Germany-Türkiye route and another from Egypt/Türkiye/UAE/Lebanon-Germany. For rhino horn, seven seizures were made by Turkish authorities, one at the Greece-Türkiye border, when the rhino horn entered Türkiye. In the remaining six cases, ivory was trafficked from South Africa and Mozambique to Vietnam and China, but all six trafficking attempts were intercepted by Turkish authorities. In an additional case, the seizure was made in South Africa before the ivory left the originating country for China via Türkiye. In the cases of pangolin scale trafficking (n = 10 records), the routes originated

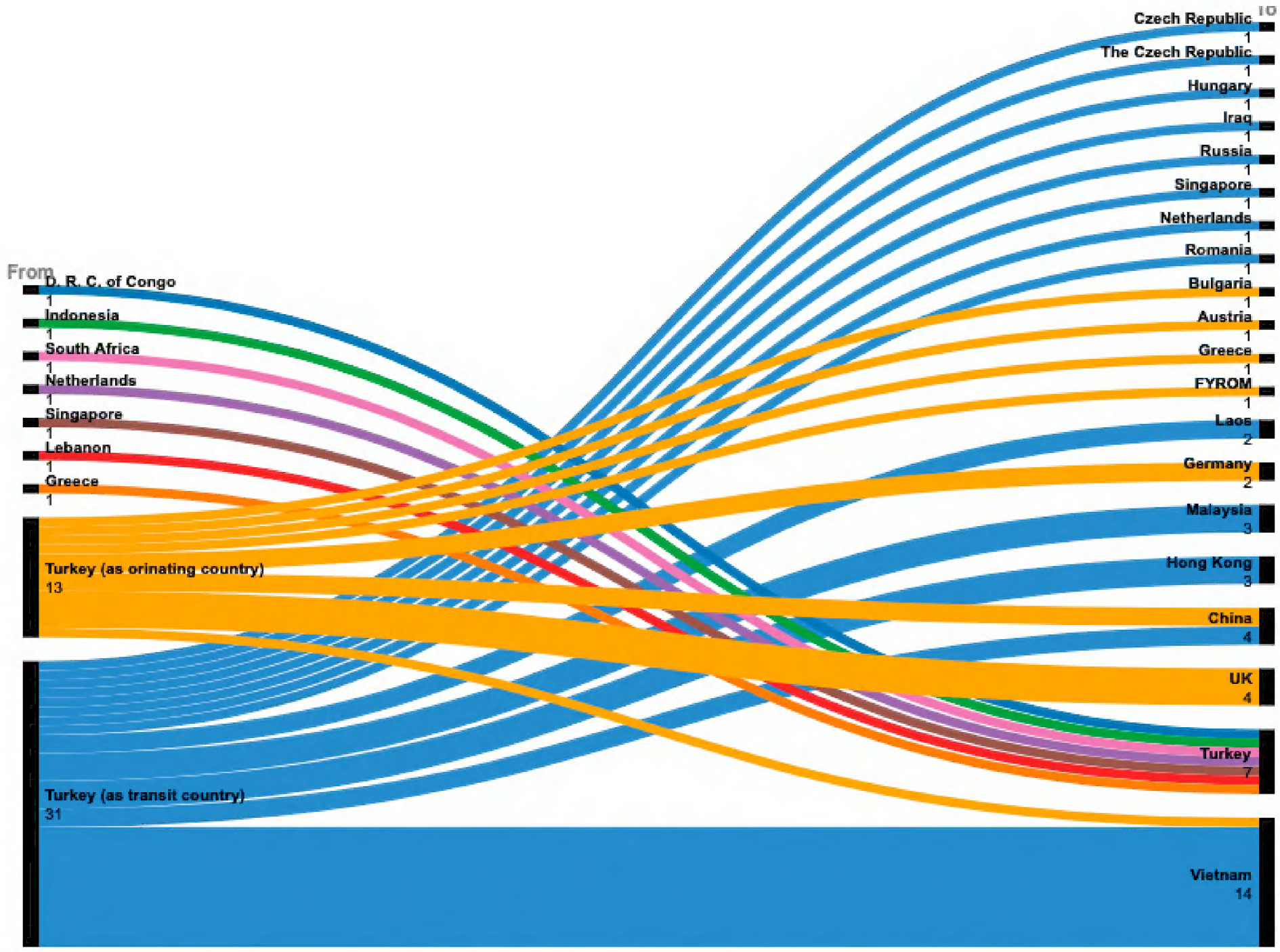

Figure 6. The flow of trafficked wildlife across countries involved as origin, transit, or destination in cases where seizures occurred, and Türkiye was an origin, transit, or destination country between 2011 and 2022. Not all seizures were made in Türkiye. The data used to create the figure are presented in the Suppl. material 1.

in the D. R. Congo, Nigeria, and Ghana, transited through Türkiye, and were destined for Vietnam, China, Laos, Hong Kong, and Romania. Seizures occurred in Vietnam, Nepal, Thailand, Hong Kong, and Türkiye.

Discussion

This study is the first attempt to analyze the illegal international wildlife trade related to Türkiye. The analysis provided critical insights into the scope, patterns, and challenges associated with wildlife trafficking in this region. This study highlights Türkiye's significant role as a transit hub and the diversity of species involved.

Trafficked wildlife species and their impact

The seizure records indicate a wide range of species involved in illegal trade, with mammals (63.6%) and reptiles (20%) dominating the dataset. The quantities seized, including 3,156 kg of elephant ivory, 6,566 kg of pangolin scales, and 990 tortoises, reflect the significant scale of trafficking and its potential to threaten biodiversity. Moreover, research shows that traded wild animals typically endure negative welfare experiences, including extreme hunger, thirst, pain, fear, and chronic stress (see Lambert et al. 2025 for an extensive review).

The rare seizure of an infant gorilla at Istanbul Airport on December 22, 2024, is particularly noteworthy given that only an estimated 14 infant gorillas enter the live trade annually, with a global retail value of US$560,000 to US$2.1 million (Clough and May 2018). The illegal gorilla trade threatens critically endangered populations with extinction (Estrada et al. 2019; Badihi et al. 2024). Capture and transport cause high mortality and stress, while human contact risks zoonotic diseases (Badihi et al. 2024). This incident underscores the vulnerability of critically endangered species to trafficking and the need for targeted enforcement to prevent such high-value, low-volume trades. Additionally, the predominance of wild animal parts (61.8%) over live animals (36.4%) suggests that processed products, such as ivory and pangolin scales, are more commonly trafficked, possibly due to their higher market value and ease of concealment.

Wildlife seizure trends over time

Temporal analysis of illegal wildlife seizure records revealed high annual variability ($\sigma = 3.65$) and moderate monthly variability ($\sigma = 2.07$), with counts peaking in August ($n = 9$) and lowest in October ($n = 1$). The variation of records can be a result of several different factors (Morcatty et al. 2020). For example, variation may suggest potential seasonal trends, possibly linked to increased trafficking activity during certain months due to logistical factors, such as higher air travel or cargo volumes in summer. August records the highest number of seizures, which might align with the peak tourist season in Türkiye and globally, leading to an increased number of passengers who could inadvertently or intentionally carry wildlife products. Conversely, months with lower seizures, like October, might correspond to off-peak travel periods. The high number of seizures might also coincide with periods of heightened law enforcement activity (as a factor of staffing levels or improved security protocols), introduction of new detection technologies or methods such as DNA forensics (e.g. Wasser et al. 2008), international law enforcement operations, increased media attention, or awareness raising campaigns specifically targeting wildlife trafficking (Paudel et al. 2022). On the other hand, lower seizure numbers could be attributed to reduced law enforcement capacity resulting from factors such as staff reallocations, budget cuts, inadequate legislations or other resource constraints (Moreto and Lemieux 2015; Siriwat and Nijman 2018; Paudel et al. 2022). Variability in seizure records can also be influenced by the fact that wildlife traffickers might adapt their strategies based on perceived risks or patterns in law enforcement, potentially changing routes or methods (Heinrich et al. 2016; Kurland et al. 2017). For animal parts like ivory and pangolin scales, traffickers might stockpile items during periods of high risk or low demand, resulting in fewer seizures at certain times of the year and a sudden increase when they decide to move large quantities (Maron 2021). Economic downturns and shifts in consumer demand could also influence the demand for illegal wildlife products ('t Sas-Rolfes et al. 2019; Morcatty et al. 2020). The availability of certain wildlife products might be seasonal due to breeding cycles or hunting/poaching seasons (Moreto and Lemieux 2015; Kurland et al. 2017; UNODC 2020), which could also influence when these products are seized. Furthermore, differences in how seizures are reported or publicized by the national authorities to the international authorities could also contribute to the apparent variability. For example, high-profile seizures, whether due to the species involved

or the quantity seized, might be more likely to be documented and reported. In summary, the variability in the number of seizures can be attributed to a complex interplay of factors including enforcement dynamics, consumer and trafficker behaviors, global events, legislative changes, and reporting practices.

Türkiye and wildlife trafficking dynamics

The data reveal that Türkiye is predominantly a transit point in 61% of the 55 seizure records between 2011 and 2022, with 14% as the final destination and 26% as the originating country. This underscores Türkiye's strategic position in global wildlife trafficking routes, connecting Africa, Asia, and Europe. Notably, seizures involving elephant ivory, pangolin scales, and rhino horns frequently transited through Türkiye en route to destinations such as Vietnam, China, and Malaysia. For instance, pangolin scale trafficking originated in countries like the D.R. Congo, Nigeria, and Ghana, transiting through Türkiye to Asian markets. Similarly, rhino horn trafficking routes often involved South Africa and Mozambique as countries of origin, with Türkiye serving as a conduit to Vietnam and China. These patterns suggest that Türkiye's geographical location and robust transportation infrastructure, particularly air cargo and checked luggage (accounting for 24% and 29% of transport methods, respectively), make it a critical node in illicit wildlife trade networks. The high number of seizures in Türkiye (n=15), compared to other countries like Vietnam (n=7) and China (n=5), further emphasizes its role as a key interception point, likely due to active enforcement efforts by Turkish authorities, as seen in the seven rhino horn seizures. Although the seizure records for African grey parrots in this study were very limited for 2011–2022 period, research indicates that Türkiye is a major importer of African grey parrots and plays a significant role in the global trade of wild-sourced grey and Timneh parrots (*P. timneh*), serving as a transit point for air transport between Africa, Europe and Asia (Mundy-Taylor 2013; TRAFFIC 2015; Martin et al. 2018).

Research also shows that Türkiye was a key exporter of live reptiles to the EU, as identified in illegal trade seizure records from 2007 to 2011 (Mundy-Taylor 2013). Although not evidenced by the seizure records of this study, red-eared sliders (*Trachemys scripta elegans*) were the primary species seized from Türkiye during that time period, according to Mundy-Taylor (2013). Moreover, the present study indicates that, for the tracking of ivory (including African elephant ivory), rhino horn and pangolin scales, Türkiye serves as transit hub, connecting Africa with both Asia and Europe. Previous assessments also indicated Türkiye as a potential new transit location for rhino horn and African grey parrots, and 62% of pangolin trafficking cases that transited through the Middle East passed through Türkiye (ROUTES Partnership 2018; ROUTES Partnership 2020; Collins et al. 2022). The infant gorilla, smuggled from Nigeria to Bangkok and intercepted by Turkish authorities at Istanbul Airport, marks Turkey's first such case. Authorities should anticipate future trafficking attempts from Africa to Asia via Turkey and strengthen controls accordingly.

Effects on Türkiye's wildlife

International illegal wildlife trade also poses a significant threat to Türkiye's indigenous wildlife. Research indicates that the wildlife trade, particularly the pet

trade, has a notable impact on country's wildlife. For example, between 1975 and 2005, the Hermann's tortoise (*Testudo hermanni boettgeri*) was excessively harvested to meet the demands of the pet trade, with illegal trade being assessed as a contributing factor to the observed low genetic diversity of the species in Türkiye (Yılmaz et al. 2023). In fact, Türkiye was the primary supplier of Mediterranean tortoises (*Testudo* spp.) for the European pet trade during the 1970s and early 1980s (Klemens 2000, cited in Turkozan and Kiremit 2007; Türkozan et al. 2008). Although demand decreased in later years, Türkiye continued to supply 19% of the global legal trade in *Testudo* until 2004 (Turkozan and Kiremit 2007). The demand from the European market has significantly affected other species groups as well. For example, the impact on populations of the Wagner viper (*Montivipera wagneri*) and the Caucasus viper (*Vipera kaznakovi*) in Türkiye since the 1950s (Auliya et al. 2016; Tok et al. 2020), where trade created an existential threat to those species (Auliya et al. 2016). Eventually, over-collection can drive those species to extinction in a relatively short time, as their populations are restricted to small ranges in mountainous areas (Auliya et al. 2016). International illegal wildlife trade also poses a significant threat to Türkiye's biodiversity through the invasion of non-native species into its ecosystems. The distribution models have shown that non-native reptile species pose an invasion risk to Türkiye (Farashi and Alizadeh-Noughani 2021). Non-native reptiles can increase mortality rates of indigenous species, reduce genetic diversity and eroding native genotypes through hybridization, disturb aquatic ecosystems, and even impact bird ecology (Farashi and Alizadeh-Noughani 2021).

Challenges in enforcement and detection

The study highlights significant gaps in understanding seizure detection methods, with 78% of records lacking sufficient details in this regard. Among the 22% with details, risk assessments (9%), routine checks (7%), random checks (4%), and technologies like x-ray scanning and sniffer dogs (2%) were employed. This suggests that while targeted enforcement strategies exist, their application is inconsistent or underreported. The high proportion of seizures in Türkiye by local authorities indicates effective enforcement in some cases, particularly at key transit points like Istanbul Airport. However, the involvement of 34 countries in trafficking routes underscores the need for international cooperation to address the transnational nature of the trade involving Türkiye.

Implications for research and policy

The limited number of open-access platforms contrasts with the restricted access of major databases, suggesting that policies promoting transparency could improve research efforts. The absence of peer-reviewed articles specifically addressing Türkiye's role in illegal wildlife trade highlights a research gap that future studies should address to inform evidence-based policy. Türkiye's central role as a transit hub calls for strengthened border controls and capacity-building for customs and law enforcement agencies. The diversity of trafficked species, particularly high-value items like the infant gorilla and elephant ivory, underscores the need for species-specific detection and seizure strategies. The seasonal trends observed, though preliminary, warrant further in-

vestigation to optimize enforcement timing. Addressing these issues requires a multifaceted approach, combining improved data transparency, enhanced enforcement, and international cooperation to disrupt trafficking networks and protect biodiversity. The vast majority of the 55 seizure records analyzed in this study (90.91%, n = 50) were from air travel, while only 5 records (9.09%) were from land travel. This data shows that far fewer seizures were made by customs authorities at Türkiye's land borders compared to air travel. However, the low number of land border seizures (5 records, 9.09%) may reflect lower detection rates rather than the actual volume of illegal trafficking activity in and out of Türkiye. As Carl Sagan noted, "absence of evidence is not evidence of absence" (Feres and Feres 2023). Given limited data and considering the precautionary principle, which urges action despite incomplete evidence (United Nations 1993), future studies should investigate whether international wildlife traffickers use Türkiye not only as an air transit hub between Africa, Asia, and Europe but also for land transport.

Recommendations

To address and combat the problem of international illegal wildlife trade, I recommend the following variety of different approaches:

1. An assessment of national legislation is recommended to identify gaps and potential loopholes in existing laws and procedures. Based on these findings, targeted legislation could be developed to combat the illegal wildlife trade.
2. The national wildlife authority could establish partnerships uniting air and land transport companies, relevant government agencies (e.g., customs, law enforcement, conservation organizations), universities (including taxonomic experts and wildlife trafficking researchers), and international or national donors committed to preventing illegal wildlife trafficking.
3. Wildlife law enforcement authorities should monitor social media for content advertising illegal wildlife trade to identify trafficking networks, facilitate seizures, and gain insights into consumer behavior, thereby reducing animal suffering and enhancing biosecurity (Martin et al. 2018).
4. Public information campaigns could highlight zoonotic disease risks and legal consequences of exotic pet ownership to deter purchases, with evidence suggesting a 39% reduction in consumer intent (Can et al. 2019; Moorhouse et al. 2017).
5. Local researchers interested in studying illegal wildlife trade could monitor and analyze social media platforms to gain insights into trafficking patterns and networks. Evidence suggests that social media serves as a valuable data source, as traders frequently share detailed information about illegal wildlife transactions on these platforms, often due to a perceived lack of enforcement (Martin et al. 2018).
6. Controls and law enforcement on modes of transport and key transit points in source, transit, and destination should be conducted within the framework of adaptive management. Illegal wildlife trade routes may evolve, but major suppliers and consumer markets remain largely stable (OECD 2016).

7. Under the precautionary principle, national authorities should restrict trade in non-native reptile species for commercial breeding or pet trade, given Türkiye's high susceptibility to invasive species risks (Farashi and Alizadeh-Noughani 2021).

Study limitations

While seizure data is currently the best method for exploring wildlife trafficking around the world, the findings of this study are not meant to represent the complete extent of wildlife trafficking involving Türkiye but aim to highlight patterns observed in publicly available records. Only two organizations, the EIA and C4ADS, provided open-access data via platforms like the Global Environmental Crime Tracker and Wildlife Seizure Dashboard. In contrast, databases like CITES Illegal Trade Database, WCO, and TRAFFIC's TWIX platform were restricted to authorized entities, limiting public and research access. Furthermore, the limited granularity of C4ADS data, which reported total amounts seized rather than individual incidents, necessitated its exclusion to avoid duplication, illustrating challenges in data standardization. The lack of detailed species identification in many records, with species often reported under broad categories like mammals or reptiles, and the absence of exact quantities in some cases, further complicated efforts to quantify the trade's full extent and impact.

Conclusion

This study aimed to identify and analyze the international illegal wildlife trade involving Türkiye, a global crisis that exacerbates species depletion, animal welfare concerns, and zoonotic disease risks. The primary finding is that international wildlife traffickers use Türkiye predominantly as a transit hub, alongside secondary roles as a destination and origin. This underscores Türkiye's pivotal role in trafficking networks spanning 34 countries, driven by its strategic geographic location connecting Africa, Europe, and Asia via air transport. The reported wildlife seizures in this study reflect both enforcement efforts by Turkish authorities and the scale of illicit trade. The diversity of trafficked items, ranging from live animals like tortoises and African grey parrots to rare cases like an infant gorilla, highlights the trade's complexity. This study's findings are vital for conservation, animal welfare, and law enforcement, calling for stronger border controls, enhanced detection methods, and global cooperation under frameworks like CITES. It provides actionable recommendations to disrupt trafficking networks, enhance data collection, and reduce demand in consumer markets. By guiding policymakers, conservationists, and authorities, the study fosters international collaboration, efficient resource allocation, and endangered species protection. The EU's unexpected role as a destination, notably for certain species, demands stricter import regulations across member states. The trade's complexity, spanning origin, transit, and destination countries, requires governments to prioritize wildlife trafficking globally. Trafficking can only occur when detection and law enforcement measures fail at both the originating and destination countries, and, where relevant, in the transit country. Unified global action is essential to mitigate the devastating impacts of illegal wildlife trade and ensure sustainable ecosystems.

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Additional information

Conflict of interest

The author has declared that no competing interests exist.

Ethical statement

This study was conducted using solely publicly available data sources.

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Author contributions

Özgün Emre Can: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Resources, Visualization, Writing – Original Draft, Writing – Review & Editing.

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Data availability

All of the data that support the findings of this study are available in the main text or Supplementary Information.

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Supplementary material 1

Collated seizure records from 2011 to 2022

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Data type: pdf

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